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EXTRACTS

FROM VARIOUS AUTHORS

ON THE

CULTURE AND PREPARATION OF FLAX.

The 1st, to page 24, reprinted from a very valuable and scarce Work.

The 2nd, from the Encyclopædia Britannica.

The 3rd, an Abridgment from an unpublished Report, in the Agricultural Transactions, by Robert Somerville, Esq.

The 4th, expressly written for this Work, by a practical Flax-raiser in Fifeshire.

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EXTRACTS FROM VARIOUS AUTHORS

ON THE

CULTURE AND PREPARATION OF FLAX,

AS THE MATERIAL OF MANUFACTURE.

Inquiry, if Scotland be adapted to the Growth of Flax.

THOSE who would dissuade the people of Scotland from the cultivation of flax, contend that it is a plant which requires a warm sun and fertile soil; that large continents, where the seasons are regular, are best adapted to its growth; that it was a native of the fostering mould of Egypt, where it attained its greatest perfection, and has everywhere degenerated, as it has been carried westward; that in Scotland, where the air is cold and the soil barren, flax could only be raised on the most fertile spots, which, on account of its quality of greatly exhausting the land which bears it, would soon be rendered unproductive.

I am persuaded there are few subjects on which so many erroneous opinions have obtained, or been so pertinaciously held, as on this, of which we are treating. After carefully attending to this matter for more than twenty years past, almost always annually cultivating some quantity myself, and observing the conduct of other flax-raisers, where I had the opportunity, I never could discover any thing to justify the opinion, that either the coldness and sterility of the country, or the impoverishing effects which flax is supposed to have upon the soil, can prevent its being raised in abundance, to supply the manufacture of the country.

In fact, it is the hardiest plant cultivated in our fields. It delights in a moist air, and requires frequent showers to nourish it, which are generally frequent enough in Scotland. Good crops of it are often obtained from land which is far from being the most fertile. I have seen pretty good flax grow on a patch of land from which several inches of the rich upper soil had been recently carried off, and this would have disqualified the spot for bearing a good crop of grain, till it had been restored by rest or manure. There are districts in Scotland, in which little advantage is expected from tillage and corn-crops, where, nevertheless, the flax which the inhabitants sow, turns out better than in the more productive grain countries. In the parish of East Monkland, in the county of Lanark, which is nearly the most elevated arable land in Scotland, and consequently unfit for producing valuable grain-crops, the inhabitants have long been successful flax-raisers. Flax is never now sown in that parish on the richer infields, which bear the best crops of corn, but on the outfields, in the second, or even the third year after manuring; and all the manure given is a compost, consisting chiefly of moss earth, or the same earth half burnt, laid upon the pasture in the autumn before the ground is broken up. In my own practice, I have always found it a greater error, to give land intended for flax too much, than too little manure. Land in a rich condition will raise flax as well as other plants, more quickly and to greater luxuriancy; but the produce will not be necessarily greater, and the quality will always be coarser. Upon the end of a ridge which I had prepared for flax, some manure of a very enriching quality was casually dropped. Here the flax sprung up with great luxuriancy in the beginning of the season, and far overtopped the rest of the field; but in the end, the whole field attained nearly the same height, and the same bulk of these forward stalks, neither produced so much scutched flax, nor was it so strong, or of so fine a quality as the rest.

A potent sun and a great degree of fertility, are not necessary for raising flax. It abounds in high northern latitudes. In our own country, it requires less time in the ground to bring it to maturity than any other field-crop, and suffers less injury from cold seasons. I have observed, in the month of June, when there was frost in the mornings, and a cold withering wind through the day, that the flax was growing at the rate of half an inch in twenty-four hours, whilst the leaves of beans and oats, our hardiest plants, became yellow, languid and decaying. The last year (1784), which was a remarkably cold and backward summer, the flax-crop was plentiful, and proved very well, even in some places of the country where the corn never arrived at full perfection. And, indeed, in every cold season, the flax-crop is more abundant than in warm years. Probably the reason of this is, because the exhalation is less violent in cold seasons; but it is still a proof of the hardiness of the plant. Very cold wet summers, it is true, produce a great deal of flax of a coarse quality; but we import, at a great expense, large quantities still coarser, from Riga and Petersburg. Upon the whole, there appears nothing in the nature of the country to forbid the inhabitants of Scotland to attempt the culture of flax. It is the excellence of this plant, to have a slender stalk, covered with a strong tough rind. These are not the natural productions of a vigorous soil and a fostering atmosphere, where the stems of plants, growing up luxuriantly, attain a large size, of a spongy texture, surrounded with a soft weak exterior integument. In circumstances less benign, the stalk is less extended; but the external fibrous integument, the material of the manufacture, which is the support of the plant, is more firm and strong. This is analogous to all the operations of nature before our eyes, the solidity of the production being always in proportion to the severities to which it is exposed (1); and it ought, surely, to lead to the conclusion, that Scotland is a country in which plenty of good flax may be raised. I have now cultivated flax in different kinds of seasons, and although, for a time, I did not often succeed, by inquiring minutely into the causes of failure, and improving by former errors, I find that, with proper attention, I can always have a valuable crop, and am fully convinced that this country is capable of producing abundance of the material of the linen manufactory, of an excellent quality.

From what we have seen, there is nothing in the coldness of the air, or the sterility of the soil, to prevent the propagating of flax in Scotland. The quality which that plant is alleged to have, of exhausting the land, has still less weight. Speculative writers upon agriculture have dogmatically decided certain plants to be robbers, and others enrichers of the soil. Culmiferous plants have been ranged in the former, the leguminous in the latter class. It is probable, because flax grows with an upright stalk, bearing seed upon the top, that it has had the misfortune to be ranked among the robbers. Perhaps this hypothesis, like many others, has been too hastily and too widely adopted, without a sufficient series of concording experiments to support it. Were it necessary or proper here to make so wide a digression, I could mention several which tend to overturn it. I agree, that experience shows a proper rotation of the different kinds of crops, where it can be conveniently followed, to be prudent husbandry. But as the plants of the field have not admitted me into all the secrets of their manner of life and feeding, nor laid open to me the exact degrees of the selfishness or liberality of their different natures, I shall leave the general discussion of this subject to others. One thing I know, it is an established opinion among many experienced husbandmen, that the crop which remains longest on the ground, between sowing and reaping, impoverishes the most: if this be well founded, flax, which very soon attains its full growth, cannot be very prejudicial to the soil. This I have found to be confirmed by fact; for I have often observed a part of a field, upon which flax had grown one year, produce corn in the subsequent season, which distinguished itself to be better than the rest of the field, even at a distance, though the manuring and culture had been the same through the whole. I also remember once to have seen two successive crops of flax upon the same field, which both looked well, and, I was informed, both proved good. But to satisfy myself more fully on this head, I kept the grain-crops, which grew the two immediately subsequent years, upon a piece of ground which had produced a very weighty crop of flax, separate from that of the rest of the field, in order to ascertain which was most productive. The first year, the grain on the flax ground, which was of the same kind with the rest of the field, and sown the same day, was proportionally greater than that of the rest of the field, as four is to three. The second year, the trial was equally in favour of the flax ground; but as it was a different grain, and managed somewhat differently, the experiment is not quite so decisive. The whole, however, served to convince me, that the plant possessed none of that spirit of robbery which has been attributed to it. But, whatever be the case, it is impossible the land in Scotland could be impoverished, by raising the flax necessary to supply its own linen manufactory, provided that a regular rotation were observed.

Of the means of rendering the Culture of Flax general.

From what has been said of the hardiness of the flax-plant, and the fitness of the air and soil of Scotland to produce it of a strong and valuable quality, it will probably be asked, How it comes to pass, that, with such advantages, a thing which has been so eagerly desired, as providing the material of the principal manufacture of the country at home, and so much pains taken to promote, should never have been accomplished? I shall have occasion, more fully, to investigate the various causes of failure, and obviate this difficulty as we proceed. In the meantime I shall only observe, that the mistaken notions which have been entertained about the nature of the plant, and the instructions founded upon these, which have been so widely inculcated, and so generally received, have baffled the good effects of those lessons which experience had taught the former cultivators of flax, and prevented husbandmen from availing themselves of the advantage which the growing demand of an advancing manufacture exhibited.

But continued experience and careful observations might at length have corrected the mistakes, and dissipated the prejudices which had unfortunately crept in, if the culture of flax had been supported by a proper succession of employments, to carry on the different processes which are required in the preparation of it, as the increase and improvement of the linen manufacture seemed evidently to demand. It is by this succession alone, that the culture of flax can become successful or advantageous to the country; and of this we now proceed to treat.

The substance of what I propose to offer on this subject, is contained in some little essays on the improvement of the country, which I had sketched out a great many years ago, and augmented by observations made from time to time. As I find myself much anticipated by some publications I have since had occasion to peruse, particularly by a series of letters written by the same Dr. Anderson, who has been so often mentioned, and published in Messrs. Ruddiman's magazine for the year 1772 (Vol. 14), under the signature of *Agricola* (2), which contains many sensible observations, offers some ingenious hints, and treats at great length the most important head, *viz.*, The subdivisions of employment, under which the different processes on flax ought necessarily to be conducted, to insure success, I shall be more concise on the subject, avoiding as much as possible the repetition of any thing which I have seen in the possession of the public. However, the necessary divisions of labour upon flax, being the only basis on which any rational plan for promoting the culture of that plant can be founded, cannot be lightly passed; but, to avoid tediousness, I shall refer any reader, who wishes to see the particular arguments in favour of it, to the above treatise.

The divisions of employment, which I would recommend as necessary to carry flax from the seed to the spinning-wheel, are three, *viz.*, The sower or raiser,—the rough preparer or scutcher,—and the flax-dresser. The business of each, we shall treat in their order.

Of the Choice and Preparation of Land for Flax.

Much has been said about the choice of the soil proper for flax, and the preparation requisite for that crop; I shall confine myself to a few general remarks, the result of experience, and observations made in a long course of inquiry into the subject, hoping to be excused, if travelling over grouud which has been often trodden, I should sometimes be obliged to take a beaten track.

The inequality of the climate of Scotland is more unfavourable to the growth of flax, than any fault in the soil. Though we experience frequent and heavy rains,—though the wetness of our weather is inimical to agriculture, impeding the labours of the husbandman, and too often blasting his hopes; yet, when the clouds are exhausted, and the sky clears, the exhalation is sometimes excessive, and the dry weather becomes no less detrimental than the wet. The crop upon land which has been much soaked during the wet season, suffers most in drought. Any soil, if it be at all adhesive, after having been intimately mixed with water, settles, when it dries, into a paste too solid for the roots of plants to penetrate and extend themselves, so as to draw the juices necessary for their nourishment; and thus the growth continues weak and insignificant, till the return of rain, sufficient to soften the hard crust, in which the roots are pent, recals fresh vegetation.

No crop, in such circumstances, suffers more than flax. It is a plant which can ill bear a great drought. Its roots are small and delicate, unable to make their way in a stiff mould. The stalk itself languishes sore under a scorching sun. And its growth being soon over, when the dry weather in the beginning of summer continues long, the crop is past recovery before rain falls in sufficient quantity, to answer that purpose.

The most common causes of the failure of the flax crop, which the attention of the raiser may in some degree prevent, are the following, viz. 1st. The seed springing unequally, by which the crop, not all coming forward at the same time, is much less valuable: 2ndly. Its growth being checked in the beginning of summer by violent drought, and prevented from attaining the proper length. 3rdly. The plant ceasing to vegetate before it arrives at maturity, which the country people call firing; this also is probably often owing to a violent exhalation and a parched soil, when the summer is farther advanced; and, lastly, the crop being incumbered and choked by the weeds springing up amongst it (3).

To guard against those causes of failure, ought to be the principal indication in the choice of the soil and preparation of the land for flax. Hence it will appear, that those parts of the country which have a moist atmosphere, are to be preferred for this crop. Such are all lands in an elevated situation, where the mists are frequent and the exhalation moderate, or lands in the vicinity of high mountains, whose tops attract the vapours and moisten the air around, provided the soil be fit to produce a tolerable crop of any kind (4).

All good lands, which have a moist, but not a spongy bottom, that is, where there is a proper soil of a tolerable depth, covering a regular parallel stratum of a compact texture, which does not suffer the moisture from the surface to drain through it, nor the subterraneous water to spout up in springs.

The soils most proper for flax are such as lie pretty compact, but not so adhesive as greatly to resist the action of the plough and harrow, not apt to heave and swell with drought, nor melt into dough with rain.

Those parts of the country where the most frequent and violent summer droughts prevail, or where a dry open bed of gravel lies immediately below the soil, however fertile the land may be, promise the least certain hopes of good crops of flax.

Flax ought never to be sown on dry coarse grained, sandy, or porous gravelly soils, on which the crops are frequently observed to be scorched by the summer's heat.

But though there be some soils and situations better adapted to the production of flax than others, there are few places, fit for producing corn, on which, by a careful and judicious preparation, tolerable flax may not be raised.

In the preparation of the land for flax, three things are implied, viz. to free it from weeds,—to manure it properly,—and to put it in a condition to retain a sufficient degree of moisture for the nourishment of the crop; which will divide what remains into three parts.

Of freeing the Land from Weeds.

Flax cannot bear to be disturbed with weeds, and if the land be not previously cleaned, no pains, at the time the crop is sown, or while it is growing, will much avail. The cleaning of land from weeds is now pretty generally understood. Weeds cannot be totally destroyed without stirring the land repeatedly in summer, and turning them out during the time of vegetation. When land has been run wild by a course of bad management, and abounds with the roots of perennial-rooted weeds, a complete summer fallow will sometimes be necessary: But, for the most part, the same purpose may be effected, by taking a crop planted in rows, and carefully hoeing the intervals till the weeds are extirpated. The return of the drilled crop, if the hoeing be carefully performed, will generally be so considerable as to defray all the expense, and yield more profit to the husbandman, than a crop sown at large. But when land is much occupied with the seeds of weeds, the more frequently it is stirred, the more freely will they vegetate, and one year's hoeing will not be sufficient to extirpate them; when, therefore, land is to be cleaned, with a view to a flax crop, a second drilled crop should be taken, and repeated hoeings continued another year. When two years' hoeing is thought necessary, such plants as require deep hoeing might be planted the first year, and succeeded by a crop for which more superficial hoeing would serve, that the ground may be somewhat consolidated before it be laboured for flax. The importance of having the land tolerably firm, previous to its being turned up for the flax-seed, will appear from what follows.

Land which has been so prepared as to produce a good crop of turnip, and that crop kept clean with the hoe, will be in good condition for flax, provided the turnip crop be removed from the ground before winter, and the land have not been too much dunged with the turnip.

It would here be superfluous to offer any directions for drilling and freeing land from weeds by repeated hoeing. The subject has been often and amply treated, and its importance fully shown. I shall only observe, that it can be no hardship on the husbandman to have the crop of a few acres of his farm planted in rows, in order to prepare for flax. The culture of potatoes, in which cleaning and stirring the ground is absolutely necessary, is now general through all the country, and has habituated the people everywhere to the use of the hoe; and instruments to facilitate the planting and cleaning of drilled crops are become pretty common, so that the difficulties which attend the entering upon a new practice are removed, and the husbandman can know, before he begin, the expense accompanying the execution.

The advantages resulting from the hoeing husbandry, besides being a proper preparation for the flax-crop, are considerable, and will amply reward the additional trouble. The two greatest causes of disappointment to the hopes of the husbandman, who has been industrious to enrich his land, are the great quantity of weeds which spring up in land to which much manure has been applied, and the shoals of crawling insects to which such land gives birth, who easily make their way through land heaving with the fermentation of rotting vegetables, increase their numbers to an amazing degree, and devour the tender roots of plants, when they first begin to extend themselves in the soil.

When weeds grow up in great plenty, there are no means of destroying them, without endangering the crop, except planting it in rows, leaving room betwixt them to attack the weeds alone; nor is repeated stirring of the ground less proper to discourage the increase of vermin than of weeds. Turning over the ground beats them out of their lodgments, fills up the little cavities through which they pass, and disturbs their destructive operations. There is scarcely any instance of a hoed crop being much injured by cut worms (5).

Of manuring the Land.

With respect to manuring land with a view to the flax crop, I have endeavoured to show, that a very high degree of fertility in the soil is not necessary for producing this plant; that, on the contrary, the land on which it is intended to be sown, ought not to be in a condition to raise the stems of plants to the utmost luxuriancy, a weak external integument being the inseparable companion of such forced growth; yet as the expense of seed and the preparation of the land is considerable, and as a short crop of flax is almost useless, it would be imprudent to risk sowing it on land from which a pretty good crop of grain might not be expected. It will, therefore, be the business of the husbandman to guard against both extremes; to do which, he ought, in the management of his land, to have an eye to the flax crop some years before it is to be sown.

For poor land, which has lain some considerable time at rest, and is free from the roots and seeds of noxious weeds, as much manure laid upon the ground as will produce a close plentiful crop of peas or vetches, and the flax succeeding the peas crop, is an excellent preparation.

Land which has been laid down in good order, and has lain for some years in pasture, will be in good condition for a crop of flax, without any manure or other preparation, besides the seed furrow. When lime is laid on upon old grass grounds before they are broken up, the flax crop may be more advantageously taken the second, and sometimes the third year. Although the crops of land upon which lime has been recently laid, are subject to suffer by drought, it is probably a good preparation for flax the subsequent years, when it is more fully incorporated with the soil, and been longer saturated with water. I have observed on fields which had been partially limed, that the corn on the parts where lime had been laid, though hardly any stronger to appearance, while growing, than that on the unlimed parts, had a stalk which felt stronger and firmer in the hand; and this difference is always very discernible on the stubble, after such fields have been reaped. As strength and firmness of stalk is the excellence of flax, judging from analogy, it seems reasonable to conclude, that lime is a proper manure for flax; and this is also confirmed by experience, flax grown on limed land being generally found to prove well at the mill.

When land has been exhausted by cropping, and overrun with weeds, it requires not only to be cleaned, but recruited with plenty of fresh manure. Land, of which weeds have got full possession, will scarcely be thoroughly cleaned by one season's hoeing, and strong dunging will make the weeds which remain spring up with more vigour. In such circumstances, potatoes, beans, or cabbage, which require both manure and culture, will be very proper for the first crop: The intervals between the rows of the crop may be stirred with the plough or the hand-hoe, at the pleasure of the owner, till the weeds are extirpated; but the deep hoeing necessary to destroy large rooted weeds, will divide and open the soil too much, and the fermentation occasioned by the application of great quantities of fresh manure, will increase this openness, so that the land will not be in a condition to support the stalks of flax in the subseqent season in an erect posture, the situation in which the air will have the greatest effect to form and strengthen the fibrous integument around them; for this reason, a second crop planted in rows is recommended, for which a more superficial hoeing will serve to kill the remaining weeds, that the land may be allowed to condense a little before the next ploughing. This perhaps will be found to be the very best preparation for flax.

There is one kind of manure which is neither so highly caustic as lime, nor excites so strong a fermentation as dung, which has been successfully applied to the raising of flax, viz. mossy earth reduced to ashes. This is much used by the people of East Monkland, already mentioned. There are many places in Scotland where this manure can be made in great quantities at a small expense. It may be applied with success either to the previous crop, or to the flax crop itself, provided it be laid on betimes, and carefully spread. It is an excellent manure for open land, which is subject to swell in the time of drought: it seems in a great measure to prevent that, and never fails to raise a good crop on such land.

Of preparing Land to resist the Summer's Drought.

To put the land in a situation long to resist the effects of the summer's drought, which I have endeavoured to show, is very injurious to flax; it ought to be laboured for the seed, at a time when it is firm and dry, immediately before the winter set in, and turned over as deep as the soil will admit, or at least as deep as a plough or spade in ordinary cases goes; it ought to be well laid up, to throw off the rain, and as free as possible of inequalities in the surface, which might hold water, with proper furrows to drain quickly away all the water which falls, and none should ever be allowed to stand. It will unfit land for every crop to be much soaked with water; but the flax-raiser must be particularly attentive to have this land always well-drained during the wet season.

With people experienced in agriculture, who have had occasion to observe the advantage of early and dry labour, I might rest this proposition, certain of obtaining their assent; but to those who are not, it may appear somewhat paradoxical to assert, that the best way of preserving the soil long moist is to keep it as dry as possible: It may, therefore, be proper to explain in what manner the weather acts upon the soil in different circumstances.

If land be wet and soft when it is ploughed, those parts of the clods which come in contact with one another, yield to the reciprocal pressure, and the whole subsides into one mass. If this happen early in winter, the rain which, on account of this intimate conjunction of the parts, is retained in every little cavity on the surface, melts the whole soil into one continued stratum of soft tough paste, very unfit, when the spring comes on, for the purposes of vegetation. Early frost, when succeeded by rain, facilitates this unfortunate solution, and the most powerful action of late frost is but a partial remedy for the evil.

Land ploughed later in the winter does not dissolve so entirely. The exhalation, which increases as the days lengthen, preserves some of the uppermost clods in the shape which they assumed when turned up; but the under parts, as in the preceding case, settle together into one mass, which the upper clods, when they dry a little, cover greatly from the influence of frost; and, therefore, in the most favourable season, the mould proper for nourishing the tender crop forms but a thin layer on the surface. When spring-frost does not happen, the clods hardened by the drought, may, by the reiterated action of the harrow, be reduced into small fragments, but not to a fine soft mould, capable of resisting the drought, and producing good flax.

Land which is laboured late in the season, though it be sufficiently dry when laboured, is always unfit to support a crop in the time of great drought. The clods which the harrow does not reduce, form cavities which give admission to the dry air to wither the roots. As those clods swell and crumble by the action of the sun and rain, they, indeed, furnish fresh nourishment, so that a plentiful crop is sometimes produced in the end. This is the cause why the crops upon late laboured lands remain longest on the ground before they be ripe. As flax springs up quickly, and soon finishes its growth, late labour cannot be proper for that crop.

But when land is laboured before winter, while it is firm and dry, when it is turned up of a considerable depth, so as to form large clods capable of long resisting the influence of the weather, those clods retain the shape in which they were turned up, leaving interstices between them sufficient to let the rain which falls on the field drain away into the furrows, and the soil is never much drenched, even in the wettest weather. Although the clods for a long time preserve their original shape; yet, before seed-time, the action of the air, which has free access to the soil, when laid up loosely, and not immersed in water, has so opened and swelled its parts, and destroyed their cohesion, that as soon as it becomes a little dry, the whole easily crumbles down into a soft mould, which lies light enough for the young roots of the crop to extend in, without crannies, through which the drought might affect them. As the soil has not been melted into mortar by the water in winter, it does not settle into a hard paste during the summer's drought, and the moist exhalations freely perspire through it, refreshing the crop as they pass.

It will, perhaps, be said, that all this refers only to the heavy compact soils, which have the strongest elective attraction with water. Such, indeed, are the soils which require the most critical attention in management, and this attention will not be bestowed in vain; for a heavy soil always retains the moisture the longest of any, when it is put in a proper condition for that purpose. And it would be happy, if what is here said respecting the culture of flax, were more attended to in agricultural economy in general. People who occupy stiff heavy lands, are perpetually complaining of the injury which their crops suffer, above those of others, from the summer's drought, never reflecting, that it is the effects of the winter's rain upon the soil, and of their own conduct in the spring, which they feel in the summer. When land is left till seed-time, in the state in which the harvest was removed from it, the parts of the most compact clods yield to the influences of the weather, and gradually separate and crumble down. This pounded mass freely drinks in the winter's rain, and dissolves with it into a bed of mortar, which hardens with the return of the spring's drought. And this firm paste can only be reduced by the impulse of the plough and harrow, unto little globular fragments, between which the drought will always find access. Land, in such circumstances, may produce a very good crop, when plentiful showers, to moisten and separate these little clods, fall in the beginning of summer; but it is only labouring in a dry time, in the beginning of winter, that can prevent the bad effects of summer's drought upon the crop.

But although the difference between early and late labour will generally be more or less observable on the crop, in some proportion to the tenacity or openness of the soil, every kind of soil on which sufficient pains have been bestowed to free it from weeds, will be in a better condition to resist the summer's drought, by being laboured to a good depth, before the winter's rains, than the same land would be, if laboured in the spring; and wet labour, at any time of the year, the later the worse, will have a bad effect on every soil, except dry, sandy and gravelly grounds, which, as has been already said, are improper for producing flax. By keeping this principle always in view, the bad effects of violent summer's droughts, the sole circumstance in the climate of Scotland, any way unfavourable to the growth of flax, may be avoided; and, with the concurrence of close attention and good management in other articles, the flax-plant, instead of being a precarious crop, from the hardness of its nature, would become the most certain and beneficial one that can be cultivated in the country.

Of Sowing.

Although anxiety to explain this momentous doctrine, in order to point out the necessity and importance of a careful judicious preparation of the land for flax-seed, and show that a steady adherence to proper principles might render the culture of this plant more certain and successful, than has hitherto been generally supposed, has detained me longer than I at first intended, yet I am doubtful whether I have been able to make myself fully understood: to prevent misconception, it may, therefore, be proper, before we proceed, here to give a summary recapitulation of the instructions which I meant to convey.

Flax being a plant which can ill bear a violent drought, lands situated in a moist atmosphere, or covering a damp but not a miry understratum, if the soil be otherwise tolerably good, are most favourable for the growth of that plant.

Any good deep soil, which crumbles upon being exposed to the influence of the weather for a time, or becomes easily friable by the harrow, into a soft mould, which will lie light, without swelling, and so retain the moisture in dry weather, is the most proper for flax.

Every soil, except such as usually have their crops burnt up in dry summers, or are at all times unfit to produce a tolerable crop of any kind, may, by a judicious preparation, be brought to yield good crops of flax.

The first step in the preparation of land for flax-seed, is to clear it of weeds, which can only be effectually done, by turning over the soil repeatedly in dry weather, and killing them in the time of vegetation.

If land has been greatly overrun with weeds, one year's stirring will be insufficient to clear it to purpose, and the operation must be continued a second; but it will be proper that the hoeing of the second year be more superficial than that of the first, that the soil may be somewhat condensed, before it be ploughed up for the flax-seed.

A soil which has been just rendered very loose and open by labour and manure, may produce a great appearance of flax; but the fibrous rind, the only valuable part of the plant, will generally be weak, thin, and of a coarse quality. It might here be added, not having been pointedly noticed before, that it being one excellence in flax to be equal in length and quality, land which has been gathered into broad high ridges, till the whole soil is accumulated towards the middle, leaving only the unfertile under-stratum upon the sides of the furrows and land, which has been lately levelled down from such a shape, without care being taken to preserve the good soil upon the surface, are not eligible for flax.

It is imprudent to risk the sowing of flax on land which is not thought to be in condition to produce a tolerable corn-crop; but it ought never to be sown on land recently and strongly manured. When the land is to be recruited with manure, that manure ought to be applied on a hard compact soil one year, and on an open one two years, before sowing the flax; and it will seldom be proper to apply manure for the sake of the flax in extraordinary great quantities, especially of such a quality as will produce a violent and lasting fermentation in the soil (6).

When land is thoroughly freed from weeds, and just in condition to bear a tolerable corn-crop, there is little doubt of its yielding plenty of good flax, provided the soil be so managed as to make it capable of regularly supplying the crop with moisture, sufficient to carry it to maturity without failing; and it is plain, from experience and the nature of the thing, that ploughing with a strong deep furrow, while the land is still firm, before winter, and keeping it always well drained, and free from standing water, bid fair to answer this important purpose.

The experienced husbandman will be sensible that it is impossible to give pointed invariable rules for every part of his conduct, in the preparation of land for flax; but, by attending to the principles laid down, he may make such variations as circumstances require and his own judgment directs. Thus, for example, when a rainy autumn has so much soaked the field intended for flax, that it cannot be properly laboured before winter, the first fair season in December must be seized for that purpose; and if the soil be still too soft to bear the feet of labouring cattle, it will be prudent to dig it with spades, setting each spadeful well on end, and leaving all of them as entire and unbroken as possible. The superior success from this kind of culture, when well executed, will generally fully defray the small additional expense. There are some firm soils also which will produce good flax after potatoes, without an intervening crop, if the manuring have been moderate, and the land turned up for the flax-crop, so deep as to mix the firm under part with that which has been mellowed with the hoe; but it would be needless to enumerate every variation which might be suggested; a person of ordinary sagacity will always be able to apply what is already said to any particular case.

Having thus endeavoured to show by what means the labour of the husbandman may be advantageously applied to prepare the land for producing this valuable material of manufacture, I shall now go on with what remans within his department as flax-raiser.

It would be convenient that every flax-raiser had some one in his family a little instructed in mole-catching, to kill as many of the moles as possible, in and around the spot prepared for flax, during the winter. Moles are very prolific animals, and seem to multiply every where, in proportion to the advancement of agriculture. Every one must have observed the wonderful devastations which they sometimes make in a well-dressed field; but there is no field-crop which they injure so materially as flax. The fineness of the mould to which land must be reduced for that seed, affords them great facility in making their numerous roads immediately below the surface; by these the drought is admitted, the tender roots are disturbed and broken, many of the plants are quite overturned, and the whole crop much injured. These and other mischiefs done to the fields by moles, might be much limited, if boys, whose attention is not closely engaged otherwise, were instructed and encouraged to bestow proper pains in catching them.

The fur of moles is now known to be an excellent material in the manufacture of hats, and would certainly be purchased by the manufacturers, if it could be brought to market in such plenty as to deserve attention. If a number of boys were instructed in mole-catching, up and down the country, little warehouses, in proper places, might be opened for purchasing the skins; and supposing them to be worth sixpence per dozen, this, with what landlords and tenants might add for their encouragement, would be an object to excite the diligence of boys. Mole-catching would be as amusing, and more profitable than angling and fowling, of which many boys are very fond, and this fund of entertainment and advantage would be inexhaustible; for, if we consider the vast swarms of moles which abound through the whole country, the numbers a single female brings forth annually, and the many inaccessible recesses to which they can retire, it will appear that though, with care, they might be kept under, there is no probability they can ever be exterminated. Thus might the numbers and devastations of those little enemies of agriculture be abridged, large quantities of a valuable commodity, which now rots in the bosom of the earth, or is torn by crows and foxes, be saved to the public, and those who claim the exclusive sovereignty over a certain part of the untamed creation, be freed from a number of petty rivals in their favourite pursuits.

When seed-time approaches, there will generally appear some weeds springing up in the land prepared for flax-seed, especially if the winter has been soft, partly owing to the impossibility of extirpating the roots and seeds entirely, and partly from the seeds which are carried about by the wind, falling upon it. To get rid of these, the land ought to be close hoed over with hand-hoes, about two inches deep, less or more as the soil admits, or as the case requires, in a dry time, a day or two before sowing, that all the weeds appearing may be turned up to the air and destroyed. This is a preparation for the seed, far superior to what can be effected by the action of the harrow alone. I have always found it so important, that I never think it fit to neglect it, even when there is no great appearance of weeds. It has all the good effects, without any of the disadvantages of a spring ploughing. It stirs and breaks the soil without burying the parts, which have been prepared by the action of the sun and air for the reception of the seed, and checks the progress of weeds, without turning up the mould to be withered in the drought, and therefore always occasions a quick and vigorous appearance of young plants. In land which has been mellowed by the winter's storms, if it be not much infested with stones, this can be done at a small expense, not above seven shillings an acre.

Before seed-time it will be proper that a sufficient quantity of well-preserved seed be provided. What is a proper quantity for a given extent of land, it behoves us now to inquire. The false maxims on this head, are among the causes of the ill success in flax husbandry. It has been no uncommon error to sow almost double the quantity of seed that the land can possibly bring forward, expecting the fineness of the flax to be in proportion to its thickness on the ground. But nothing can be worse founded; for, when flax is very thick sown, if a favourable season brings it up all at once, the stalks, crowded upon one another, are weak and puny, seldom arriving at a proper length, not acquiring a close integument of the flaxen fibre around them, for want of the free access of the air to confirm it; or, if the vigour of the soil should push such weak plants to a greater height, they fall to the ground with the first rains, and cannot, by any means, be kept in that erect posture which is most favourable for the formation of flax. If the seed springs unequally, the first stalks attain a greater height; but when plentiful showers fall, the rest springs up and smothers the under part of the best stalks, so as to prevent the flax from forming upon them. It is not always from stalks which are small, by being hampered for want of room in the field, that fine flax is obtained. I have seen a field, on which the stalks were so crowded as to yield very little flax, and yet that little very coarse. Flax is best as well as most plentiful, when the stalks stand close enough to support and lead up one another, without preventing the free admission of air among them; when there is just room for every plant which springs to attain its natural height; and when the land can furnish nourishment to carry every plant to that height, without pushing any of them to an improper luxuriance of size.

In order to ascertain this fit quantity of seed, I weighed the flax-seed contained in a standard peck, and found it to be twenty pounds; one pound of this I divided into small equal subdivisions, the grain in one of which I numbered, rejecting every one which had a doubtful appearance, and found by calculation, that seven pecks to the acre of land, made near to five good grains to the square inch, which, I apprehend, is full as much as the most part of land will bring forward. From what was just hinted above, it will appear that rich land ought to have a little more seed than that which is poorer, but one peck additional will be sufficient for any land. Accordingly, continued experience has convinced me, that from seven to eight pecks of flax-seed is sufficient to an acre of land, and that the richest land should be the thickest sown (7). Hence, seven pecks and a half to the acre, will be the average quantity.

Although I am fully persuaded that there is not so much difference between any one kind of well-preserved flax-seed and another, as has been generally imagined, and that the seed of the growth of Scotland, which has been properly saved, will produce as good a crop of flax as any other: yet at the commencement of a new era in the agriculture of the country, it would certainly be necessary to take every possible precaution to insure its success; and therefore it would seem proper that seed were imported from the most approved places, that it may be discovered, by a fair trial, which produces the plant in the greatest perfection. In many parts of Scotland the Riga seed is preferred; and the flax-raisers of the French Netherlands use no other for their fine cambric flax. However, I have seen seed from the northern parts of America thrive equally well.

Though the land proprietor should be at the whole expense of the seed, the value of seven pecks and a half of flax-seed, would be no great abatement on the rent of a ploughgate of land, in order to promote a scheme which promises so much advantage; but, doubtless, landholders who were disposed to do their country so eminent a service, would find themselves powerfully supported and assisted, as well in this article of seed, as in the premiums for stimulating the diligence of the flax-raisers, and any other encouragements which might be thought necessary to introduce so great an improvement. But more of this hereafter.

Flax may be sown as early in the spring as the ground is in order to receive seed. From the latter end of March to the middle of April is a very good time, when the season offers; but, in our uncertain climate, no precise time of sowing can be assigned. I have seen flax that was sown in the beginning of May very productive, but its quality was coarse. As flax, which nearly attains its full length before the heat of July comes in, is generally finer than that which grows later, the earliest sown will be, for the most part, the finest. It ought never to be sown till the surface of the earth be dry and firm; nor ought the land intended for it to remain long unsown after it is dry, to wither in the air, till it wants moisture sufficient to make all the seeds spring at the same time. It is of the utmost importance that all the plants spring up equally; and a soil prepared, as has been directed above, if the season of sowing be carefully watched, will never fail to produce this effect.

When the land has been sufficiently smoothed by the harrow for the reception of the seed, which, after such preparation, is always easily done, the surface ought to be made even with a roller before sowing, that the sower may spread the seed more equally. It may easily be conceived from the nature of the plant, of how great importance it is, that the seed be equally distributed over the ground; and to perform it well requires a very dexterous hand. The most expert sower, when the flax comes up, will find many little faults he has committed: the best way I know to remedy these, as much as possible, is to divide the seed into two equal parts, and taking a small quantity in the hand at once, to go over the whole field regularly with the half of the seed, then returning nearly in the same track, to sow the other half in the same regular manner. After the seed is covered in with a close short-toothed harrow, the rolling ought to be repeated.

Land which has been early laboured, and lain open to the action of the air during the winter, is not much subject to heaving and swelling with the spring drought; the particles being already opened and separated, little further expansion can take place; but if it appear, by the foot making a deep impression, to be still disposed to heave, it ought to be repeatedly rolled with a heavy roller, till it become pretty compact. Although rolling be proper in all cases, in order to preserve the moisture near the surface for nourishment of the young tender roots, when the land is already compact, the rolling may be the slighter.

When heavy rains fall soon after the flax is sown, the fine mould on the surface will be apt to form into a paste, which, when afterwards hardened in the sun, the young plants will with difficulty pervade. Pulverized earth is, at all times, disposed to mingle intimately and incrust with water, but at no time so much as when it has been recently stirred; and there is no time it is so hurtful as before the seed has fully begun to vegetate. The flax-raiser therefore ought to choose a time for sowing his seed, when there is an appearance of dry weather continuing for some days; but if he should still be disappointed by unexpected rains falling, this crust should be broken as soon as it is dry, by having a roller drawn over it by men.

When the young flax begins first to appear, in all places near woods or hedges, it has a very great number of formidable enemies in the small birds, many numerous tribes of which are exceedingly fond of flax-seed, flock together in great troops to the fields where it is sown, and watching it as it bursts through the earth, on the top of the young plant, tear up altogether with their bills. I have several times known flax very materially injured by these depredations; to prevent which, some people cross the field in different places, with strings tied upon poles, and stuck up and down with feathers or pieces of strong paper of gaudy colours, which, by twirling and fluttering in the wind, scare the birds and prevent them from alighting on the flax. I have sometimes however known them become so bold as to despise these terrors; it would therefore be prudent, whatever other precaution may have been taken, to watch the field pretty regularly till the danger be over.

If weeds should still appear among the flax, notwithstanding the care taken to clean the ground, they must be carefully pulled before they advance too far and here will generally end the labour of the husbandman. But before I leave this part of the subject, there is still one cause of failure which deserves to be noticed. When flax is luxuriant, and the weather proves rainy, about the time the capsules begin to form upon the top of the stalk, it is pressed down to the ground, and sometimes remains so, lying so flat, that not only air, to form any tolerable quantity of flax upon it, is excluded, but it rots entirely. To remedy this, the French flax-cultivators taught to spread the whole field with boughs, supported on little forked stakes of a few inches long; by these means, they alleged the flax would not only be drawn up to a greater height, but also supported always in an erect posture. But this is a very troublesome expensive process, and never can become general. Even when boughs can be had at hand, which is seldom the case, it is a tedious business to support them, and spread them properly over the field. Besides, the close covering of branches contributes to interrupt the free course of the air, and renders the stalks soft and weak towards the root; and if the flax rise to a great height, and the season prove rainy, it bends over the branches, and lodges so close, in some places, that the air can have no effect upon it; and though, by being kept at a distance from the damp ground, it does not rot altogether, the flax upon it is weak, and the quantity small. But if the soil be not too rich,—if it have been rendered compact by proper culture,—if the seed be sown betimes in the spring, and the stalks not too much crowded by over thick sowing, there will seldom be danger of flax suffering by lodging. And if it should be beat down by storms of wind and rain, and do not appear to rise of its own accord, I apprehend there is a more easy and effectual way of preventing any bad consequence. For this purpose, having provided myself with a slender rod about five or six feet long, shaped like a large wooden sword, I insinuate it softly under the fallen flax, raising it gently, in small quantities at a time, and turning it up to the air. This repeated, in a dry day, as often as the flax has been laid by returning rains, exposes every part, by turns, to the influence of the sun and air, which confirms the flaxen fibre on the stalk, and makes the produce strong and plentiful. Lest there should be occasion for this operation, the furrows between the ridges in the flax-field should be cleared with a spade after sowing, to leave a narrow alley for the operator's feet to move in, without injuring the crop. Flax may thus be saved from rotting in wet weather, for the fourth part of the expense of covering it with boughs, and even this, by attending to the directions given, will seldom be necessary.

The office of the flax-raiser should end with his attendance on the growing crop. The processes which follow are not in the line of the husbandman, and may be much better performed without him. These processes must therefore be committed to other hands, before the culture of flax can become advantageous to the country.

Of the Miller or rough Preparer of Flax.

If landholders should be disposed to promote the prosperity of their country, and improve their own revenue, by employing their tenants in cultivating the material of the linen manufacture, it will be necessary to introduce a new class of people, which I have already called the rough preparers of flax. The office of those people would be to purchase the growing flax from the neighbouring husbandmen, to employ people to pull it, to steep and dry it, and to scutch or clean it, so as to prepare it for the hand of the flax-dresser. In what manner it ought to be prepared, seems, by many, to be thought problematical.

In former times, flax was generally cleaned in Scotland, by means of a hand-instrument, called a *clove*, which was a stick about four or five feet long, with a deep groove of a foot in length, cut out of the side, at one end of it; the sides of which groove were armed with two pieces of blunt-edged iron; a piece of wood was fitted into this groove, one end of it being confined by a pivot passing through it and the sides of the groove; the other was left at liberty to fly out, by turning on the pivot. This instrument the operator held in one hand, having the command of the moveable piece with his finger-ends, and in the other, a handful of flax, which had been previously bruised, till it was become somewhat pliant, by beating on a stone with a hand-mallet, and rubbing between the hands; and putting the flax between the moveable piece which hung out and the body of the instrument, he pulled up the moveable piece to press the flax against the armed edges of the groove, and thus drew the flax over them, continuing the operation till the flaxen fibres were freed of the reedy parts of the plant. The dressing was afterwards finished by drawing the flax over the points of thick-set rows of sharp iron or brass pins, kind of rude models of the heckles now in use.

This old method being thought too tedious, mills constructed to go by water, driving a horizontal fly with four arms, and sharp-edged scutchers of hard wood fixed to the ends of them, were introduced to perform the office; and it is now become the common practice to clean flax by means of these engines.

In the Low Countries and in England, flax still continues to be prepared by hand labour. The operator impending a handful, after it has been bruised, over the edge of a bench, with one hand strikes it with a wooden bill, shaped to an edge, held in the other, till the reedy parts are beaten away, and the flax cleaned.

It is something remarkable, that, in Scotland, where the price of labour was then low, recourse should have been had to machinery to shorten a work, which in Holland and England, where labour is dear, they still think it prudent to perform with the hand. It seems reasonable to think, that machines, properly constructed, and judiciously applied, might perform the greatest part of the business, as well as it can be done by the hand, and greatly mitigate the expense of preparing. The application of machinery, however, has seldom been less successful than in this instance. It is the common complaint that much flax is cut down and wasted in the mill, which might have been saved by hand labour. The momentum of the ordinary scutching-mills has been supposed too great for the purposes to which it is applied. It has also been observed, that the horizontal position of the scutching-fly, which strikes the flax at right angles, as it hangs over it, is too severe. For this reason, the perpendicular fly was much talked of some years ago; but I have not heard of its coming much into use.

It must be acknowledged that, according to the present arrangement, the substitution of machinery in place of hand labour, for preparing flax, has obstructed instead of facilitating improvement in this branch of industry. By relying on the execution of the mill, the attention of man is in a great measure removed. The flax-raisers, without making any discrimination of the different qualities of their flax, huddle it all together in a confused manner to the mill. The millers keeping no more hands than what are barely necessary to expose the flax to the action of the machine, and those preparers not being deeply interested in the success of the operation, the work is often passed over in a slovenly manner, and all kinds of flax subjected promiscuously to the same treatment, without any pains being taken to distinguish their different qualities. Sorting should begin when the flax is pulling. The most cursory observation will show, that even on the most equal soil, and after the most careful sowing, the flax is not all alike. Attention should be paid to these differences, and stalks of the same degree of ripeness, firmness, length, and thickness, put in a bundle. This discrimination should all along be kept in view, and the nature of the preparation adjusted to the quality of the flax. In the French Netherlands great attention is paid to this particular. People, become skilful by experience, are employed to inspect and sort the flax before the cleaning be begun, and that part which they find fit for the finest purposes, is deemed too valuable to be submitted to the rude shock of machinery. This women, with a leathern apron before them, take and scrape, handful after handful, upon their lap, with a long blunt knife, till it be cleaned. After it has been made as clean as possible with the knife, the dressing is finished with hand-brushes made on purpose, and the flax is ready for the spinning-wheel, without the application of any other instrument. This accurate assortment of flax, which is found to be of great importance in those places where the most refined branches of the linen manufacture have so long been practised, is totally excluded by the present mode of cleaning flax at the mill in Scotland.

The application of machinery would nevertheless be of great service, under proper regulations. Notwithstanding the clamour which disappointment has raised against the scutching-mills, there is nothing in the construction or impetus of these engines to prevent flax being cleaned by them in the most advantageous manner, provided the previous processes have been skilfully conducted, and the flax properly fitted to undergo the operation. Common sense will inform us, that flax must suffer less, the less resistance it makes to the stroke of the fly; and, therefore, the more pliant it is made by breaking, before it be subjected to the mill, it will stand the better. The imperfect bruising given at mills, is seldom sufficient for this purpose; but when the reedy part of the plant is so thoroughly broken, that the flax becomes supple and pliant, and each handful carefully made even at the ends, it scarcely suffers by the velocity of the engine. It is well known that all flax produces better at the mill, where there is water enough to drive it freely, than when it moves heavily for want of water. The velocity may, indeed, be too much increased; but the judgment of the miller must teach him to avoid that. To make a fair trial what was the most advantageous manner of cleaning flax, I took a quantity which I raised, and having got it bruised by the hand-mallet on a plain block, and afterwards broken more fully with a Dutch hand-break, an instrument which presses it between two rows of blunt-edged parallel spars of hard wood, the edges of the spars, in one row, passing into the interval between two spars in the other row, I had a part full cleaned with instruments for scutchingwith the hand, a rough part cleaned in the same manner, and afterwards finished in the mill, and a part cleaned altogether by the mill. The produce, from equal quantities, cleaned in these different manners, with the rate of charges on each, is as follows:

				s.	*d.*
Cleaned by hand instruments - - - - -	produced	19.25 lib.,	cost	3	6
Cleaned partly by hand, partly by the mill	—	18.76 lib.,	cost	1	11
Cleaned altogether at the mill - - - - -	—	18.54 lib.,	cost	1	7⅝

The first, which is rather the greatest produce from the same quantity of rough flax, was less perfectly cleaned, and the tow (the refuse of the flax) less valuable, and the expense more than double the last. The produce of the last is less than that of the second, by a small fraction; but it was afterwards discovered that a bundle belonging to the last, had been left in a dark loft where it lay, which would have made it fully equal to the second (8). The result of this experiment, which was made with great care and impartiality, shows that the machinery of the flax-mills is sufficiently adapted to the purpose for which it is intended, and that the little effect which the introduction of these machines has had to increase the quantity of the material of the linen manufacture, is not owing to any deficiency in the contrivance, but to the little skill and care with which flax is generally managed, before it be sent to the mill, and the little interest those who work at the mill have in the issue.

Introducing the line of employment above recommended, would remove these and other obstacles to improvement, in providing the material for our most standing manufacture. People employed in working on an article which they were deeply interested in turning to the best advantage, would be studious to remedy every defect, and particularly, in preparing the flax for the operation of the scutching-fly. Machines, upon the principles of the Dutch-break, above-mentioned, might easily be made to go by water, which, after the flax had been a little bruised, would more fully supple it; and the operator having his hands free, would be able to keep the flax even and neat. Machinery, in such circumstances, would prove a great assistance in the preparation of flax, and bring that material to the market in the best condition, at the least expense.

Where scutching-mills were wanting, new ones might be erected, on the most convenient perennial streams, within the districts of their respective employments, constructed upon the most approved principles. One mill may be sufficient to prepare a thousand stones of flax, or the growth of thirty ploughgates. The tenants of those mills ought to be diligent attentive people, who had some knowledge in managing rough flax. Some people of this description are to be found in the country, and they would become more numerous as the extension of flax-raising rendered their service necessary. It would be proper that they were people of good credit, possessed of a little stock to carry on the business; so that they might give sufficient security to the husbandmen for the value of the flax, payable at Candlemas following, and make regular payment when it became due.

The preparer would employ a number of hands, in the latter end of summer and autumn, in pulling, watering, drying and laying up the flax he had purchased, and those people working constantly at one kind of employment, along with a master, whose interest it was to have every thing done to the best advantage, and whose whole cares were engaged that way, would every day acquire more dexterity and expedition; and the processes in which they were employed, would be cheaper and better executed than they could possibly be under the husbandman, whose attention is always much divided, but particularly at this season of the year.

The value of the flax-crop depends greatly upon the skill and attention with which the pulling and watering are conducted, both which require a critical exactness. Flax ought never to be pulled, till it has arrived at full perfection, and begins to give tokens of decay, by shedding the greatest part of its leaves, and changing the green colour for a faint yellow; nor remain long in the ground after its vegetative life ceases. Unripe flax is generally weak, dry and dark coloured (9): when it is allowed to stand long after it is come to maturity, the fibre becomes rigid and unpliant, tinged with a brown colour, by the residuum of the juices drying upon the surface of the stalk, which sometimes can scarcely be removed by bleaching.

But when flax is just allowed to stand till it come to maturity, the flaxen fibre having attained its utmost perfection, is generally strong and of a fair colour, having a shining glossy surface, and feeling soft and mellow in the hand, separates freely in the working, and is every way most valuable. Besides the advantage to the flax, by suffering the plant to be pretty ripe, much might be obtained by saving the seed. It is an opinion commonly received, that flax degenerates by being repeatedly sown in this country; and for that reason, the greatest part of our flax-seed has long been imported from foreign parts. I have long ago known people who had continued for a course of years to sow seed of their own saving, and had always as good flax as any of their neighbours who sowed foreign seed. On the other hand, I have repeatedly seen home-saved and Riga seed sown on contiguous ridges, in equal condition; and though the former was apparently as fresh, and sprung nearly equally well at first, failed before it attained maturity, and turned out a crop inferior to the latter. How shall we reconcile this difference? There is nothing in the supposed tendency of flax to degenerate, in this country, to solve the difficulty which here occurs.

It is become an established maxim in agriculture, that plants degenerate by being long sown successively on the same fields; and it is, therefore, thought prudent to change seed frequently from one place and soil to another. I neither pretend to controvert this, nor dare I affirm that such observations as I have had opportunity of making, tend uniformly to support it in all cases. The degeneraracy against which husbandmen propose to guard by changing seed, is rather of the seed than the stalk; stately stalks are frequently found bearing seed of a very mean quality; and by some changes of seed, the extent of the stalk is abridged. Wheat, barley, oats, and rye-grass seed, brought from the southern parts of England, and sown in Scotland, though the ear be plump and plentiful, produce a short dwarfish stalk the first year. A change of seed producing such an effect would be unfavourable in flax-raising; and, indeed, it has been said, that flax-seed from Pennsylvania, where the summer is warm, generally produces short flax. (10) And probably there may be other causes for seed saved in Scotland failing, than the tendency which the plant is said to have, to run to degeneracy in the country.

The germinating power of all seeds which remain long enough in a certain degree of damp, is destroyed. A less degree may weaken, without totally annihilating this power; and a less perfect stalk may be the offspring of this diminished energy. (11) The seed capsules of flax,when first stripped from the stalk, contain a great deal of juice, which, if not quickly carried off, by being exposed to a dry air, very suddenly ferments, and produces a greater or less degree of this noxious damp. The weather, in Scotland, is frequently moist and showery at the time of flax-pulling; and the country people have often neither time nor conveniency to bestow all the pains necessary, in such circumstances,to preserve the seed. Hence, it may be presumed, that the Scotch flax-seed is seldom in the most perfect state of preservation; and, therefore, not in condition to produce a perfect stalk. From reasoning in this way, I was led to make some attempt to discover how the matter stood in fact. I, therefore, as soon as the capsules were rippled from a little flax I had raised, laid them on a kiln, covered with perforated bricks, which had been previously heated for their reception, and continued to keep up a moderate heat, turning them frequently till they were dry enough to be beat out. Although I was no way deterred by the prevalent opinion, that the germ of flax-seed is destroyed by the heat of a kiln, I made trial of this seed before it was sown, in the following spring, and had the pleasure to find, that of upwards of two hundred grains which I had put into the earth, between two folds of a woollen cloth, not one remained unsprung. After it was sown, it sprung up more quickly and equally than any I observed in the neighbourhood, and became, in the end, a very valuable crop, yielding at the rate of upwards of sixty stones avoirdupois per acre, of scutched flax, part of which, when dressed, was spun to fourteen hanks of the Scotch reel in the pound. I have still continued since, in the same manner, to save and sow my own seed, without being able to discover any appearance of the plant degenerating. I have also given some of this seed to others, by whom it has been contrasted with foreign seed; and some of them have informed me, that the former was more forward in growth, and attained a greater height than the latter. I made a very fair trial myself, in the fourth year after I had begun this practice. I divided a ridge of my flax-field into two equal halves, by running a narrow channel, with the mouth of a spade, along the middle of it. The one half was sown with very good Riga seed, the other half with the same seed with the rest of the field, which was the kiln-dried seed. There was no difference between the two sides of this ridge, in soil or culture, nor did there appear any difference in the crop. I had the opportunity to examine it every day, and could not say that the one seed gave any signs of superiority over the other. Both attained nearly the same height, and both were ready to pull at the same time. Each were kept apart, and wrought separately in the mill. The scutched flax of both, was similar in quality, and the quantity very little different; the advantage was rather in favour of the home-saved seed, but not so considerable as to infer any superiority in the seed. The average produce of the whole field, was at the rate of 77 stones avoirdupois per acre; but the ridge upon which the experiment was made, was far from being the best. The other side, which had a firmer bottom, and, lying a little higher, was better exposed to the action of the air, produced at the rate of upwards of 100 stones per acre. (12)

What has been said, will, I hope, convince the reader, that flax propagated in this country, has not the fatal tendency to degeneration which has been imagined; and, that if it were once discovered by fair experiments, whether any kind of seed be more proper for producing flax of a good quality than another, that seed may be preserved and sown, for a considerable time, without any danger, if pains be taken to dry the capsules immediately on a kiln, as above-mentioned. There is no way of preserving seed in a perfectly sound state, in all kinds of seasons, so certain as kiln-drying; and it would be well for the people in the mountainous parts of the country, where the harvest rains are so often prejudicial, if the practice were extended to the saving of corn-seed. They would not then need to complain so much of the degeneration of their crops, nor incur such frequent trouble and expense in changing seed. I have long observed, that all kinds of seeds which have been sweated on a kiln, before they had remained too long in damp, had the most quick and vigorous germination. I acknowledge, that the germ may be destroyed by the heat of a kiln; but it requires a considerable degree of heat to do it; and, with a very little judgment, that degree may always be avoided. There is no seed so well fortified against such injury as flax, when it is inclosed in a thick capsule; and therefore, there is the greater safety in kiln-drying it. It requires, indeed, a good deal of drying to preserve flax-seed shut up in juicy capsules, and might interrupt the other business of the rough preparers of flax, at this hurried season; but a lateral branch of employment would probably strike out, to remedy this inconveniency. People who were unable for more laborious exercises, would buy and carry away from the preparers, the seed capsules, at the time of rippling the flax, and by providing themselves in proper accommodations for drying and storing them up, and paying constant attention to the business, the seed might be in as perfect preservation as that of any other country, and, perhaps, prove as well in growing. Thus might the expense of importing seed, and the risk of its being injured by sea-damp, be avoided; a change from county to county, or from parish to parish, might be as effectual as from one kingdom to another; and also, when the culture of flax was become general, and all the seed carefully preserved, there would always be a great surplus for the use of the oil-mill, and for feeding cattle, for which it is very serviceable.

In countries where the culture of flax is much followed, it is customary to suffer part of the flax which appears to be of the least value, to remain unpulled till the capsule be somewhat withered, and the seed quite plump and firm, and to dry this flax in the field, and rick it up, that the seed may be preserved and beat out in the spring for sowing. There is no doubt, but the most beautiful and perfect seed may be procured in this way; but it is certain, that flax is injured by withering long in the sun, after it has ceased to vegetate; and it is equally certain, that seed well preserved, will produce a perfect stalk, though it have been reaped before it arrived at its utmost plumpness. But if it be desired to save seed upon the stalk, to injure the flax as little as possible, after it is pulled and bundled up in a dry day, it should be set up in shocks, turning the side of each bundle, which had been in the inside of the shock, outward twice a-day, for three or four days, till it be a little dried; it may then be laid together in long piles, the thickness of one length of the flax, supported upon low trestles, to let the air pass under it, and lightly covered with thatch, to defend it from the sun and rain. Flax will dry calmly in this manner, so as to keep in a rick, without the flaxen fibre being very much discoloured or stiffened by the scorching of the sun.

The steeping or watering of flax, is a very important process, which can never be properly managed, but by people who have acquired knowledge of it by experience and continued observation. To make the filaments of flax separate freely from one another, and from the reedy part of the plant, the steeping must be continued, till a pretty strong putrid fermentation having commenced, and gone on for some time, the inward reedy substance, which is less firmly connected than the fibrous integument around it, be a good deal decomposed, and easily separated from the flax in scutching. It is impossible for people occupied with a variety of other cares, properly to manage this nice process. Their impatience to have it over, seldom suffers them to continue it for a sufficient length of time, and their want of leisure, to vary it as the case requires. Accordingly, Scotch flax is seldom steeped enough; hence, a great deal is lost by the long severe working it requires, before it can be cleaned from the reedy fragments, called *shose*, adhering to it; and what is left, is rigid and unpliant.

Stripping the capsules from the new pulled flax, upon a row of pointed iron pins set in a board, which is called rippling, has been condemned by some as injuring the flax. But flax, when new pulled, is not very tender. If it be dry, as it ought to be when rippled, I never could observe any material injury it suffered by the operation; and removing the greatest part of the capsules, makes the flax more easily handled, and prevents the bundles from taking hold and tearing the stalks out of each other in lifting; so that the rippling, before it is put into the water, is rather an advantage, though the seed were of little value.

Flax, in different states, or of different qualities, requires longer or shorter steeping; that which has a small stalk, requires more steeping than that which has a thick stalk; that which has a firm hard stalk, longer than that which is soft and weak; green flax longer than ripe. Flax being sorted according to these characters, each sort ought to be put separately into the water, that none may be taken out before it be sufficiently steeped; for, it must always be remembered, that the success of the future preparation, and the quantity and value of the produce, depend much on this process being carried to a proper length; and there is commonly more loss by stopping too soon than by carrying it too far.

The water in which flax is steeped ought to be pure and soft, not impregnated with any metallic admixture, nor loaded with light small particles of earth. Mineral waters counteract the natural fermentation, and prevent the flax from softening by steeping; some of them, however clear they appear, communicate a stain which can scarcely be removed by bleaching. Water loaded with clay, has something of the same effect; particularly a kind of blueish clay, very soluble in water, which miners call mud, leaves a very strong dark stain. We have formerly been taught, that the best manner of steeping flax was to put it in a pond or pit, just large enough to contain it, the water of which must be somewhat corrupted, before the flax be put into it; "because," it was said, "a great quantity of circumambient fresh water weakened and wasted the flax, by washing away its oils;" by which is probably meant the essential oils of the plant. This is a very absurd doctrine, neither founded on reason nor supported by fact. Although the Dutch, from their situation, are obliged to steep their flax in corrupted stagnant water, it is no cause why people in different circumstances should do the same. The use of the water is to moderate and equalize the fermentation, which naturally takes place in vegetable substances lying in a wet state, not to increase it. If the water be unequally cold, as is the case in pits made in bogs, where the supply of water arises from the bottom, the flax will be unequally steeped; if the whole of the water be excessively cold, the fermentation will be prevented, and the flax will not separate freely from the shose; but flax will be perfectly well softened by longer steeping, though the warmth of the water be very moderate. I have known flax work very freely by being steeped in water, in which the thermometer stood always some degrees below 48°. The fibrous integument of the flax plant, the material of the linen manufacture, seems to derive its origin and nourishment from the external green bark by which it is surrounded. It begins to form at the root, and rises gradually as its support is required, following the growth of the plant a few inches below the top, till the flowers are put forth; after which it soon extends to the very summit. When the plant has attained its full height, and begins to approach to maturity, the green bark being exhausted, in the course of its office of nourishing and protecting the young tender filaments of flax, is dried to a thin pellicle, which afterwards dissolves in the water, or flies away in dust in the scutching. As the fibrous integument has attained its full consistence before pulling, it can derive no further benefit from the other component parts of the plant. The gross fetid matter which flax, while steeping, so copiously emits, flows from the cellulæ of the plant; if it be allowed to settle and fix up the exterior fibres, it may corrode and weaken them, or communicate a stain which bleaching will not easily remove, but cannot possibly be of the least service. Simple steeping in water cannot extract vegetable oils, though a strong putrid fermentation, which must be most violent when there is no influx of fresh water to allay it, may set some of them at liberty; but if flax could be wasted or decomposed by the gentle motion of pure water for a few days around it, how could it stand the stroke of the mill, and the action of repeated boilings in strong lees of alkaline salts, which it afterwards undergoes? The truth is, that the stalks of new-pulled flax may be boiled in water, till the parts are so fully separated that they may be scutched easily, without the strength of the filaments being any way injured. Since the quantity of surrounding water, so far from injuring flax, tends to make the process of steeping more safe and effectual, it is surely proper to steep flax in plentiful pools of pure soft water, or to have a constant stream of such water passing through it, which also washes away some of the grossest impurity, and facilitates the future labour of the bleacher. (13)

Any natural hollow, covered with a close carpet of grass, into which a plentiful stream of pure water can be diverted (by running along some grassy furrow to preserve its purity), and effectually retained by a dam, makes an excellent pool for steeping flax. Where the pool is to be dug in the ground, the bottom and sides ought to be lined with grassy sods, to prevent the flax from coming in contact with the clay; and, in all cases, there ought to be a stream of fresh water continually flowing in. In this manner may flax remain safely under water till it be fully mellowed and its parts separated, so as to work freely in the mill, without any necessity of exposing it afterwards to the dew and rain, by leaving it spread upon the grass, a process which I cannot recommend; for though the reedy part of the plant (the shose) will weaken and consume under the influence of the weather, the flax being more immediately exposed, always weakens and consumes in as great a degree. When flax is covered and surrounded by plenty of fresh water, there is little danger of its being injured by a few hours too much steeping. I have left a few bundles remaining in the water from ten to eighteen days after the rest, when the thermometer immersed in it stood from 50° to 52°. Upon trial, I found that the quantity of flax upon them was somewhat diminished, in proportion to the time they had been steeped; but what remained was very little weakened, and it was much mellower than the rest. By the time that flax is twenty-four hours in the water, a considerable fermentation has commenced; this goes on for five or six days, the flax floats, air-bubbles rise to the top of the water, and the thermometer among the flax, stands two or three degrees higher than in the water, at a little distance. After this the fermentation gradually subsides, the flax falls to the bottom, and there is no longer any sensible difference of heat. A few days after this, the flax will be well steeped. The length of time will vary with the heat of the weather and the quality of the flax. When it is fully steeped, no capsules remain adhering to the tops, the stalks feel soft and pulpy, and the flax separates from them upon the least touch.

When flax is sufficiently steeped, it is so soft and weak at the time it is taken out of the water, that a quantity of stalks, two inches round, may be pulled asunder between the hands. It must then be handled with the greatest tenderness, treated softly when it is rinsed in the water, and gently carried on a hand-litter, and laid in single bundles upon the nearest green bank. Though it be improper to allow flax to lie long spread upon the grass, it is the most regular and expeditious way of drying it, to spread it thin immediately, and to continue opening and turning it, so that all parts may be exposed to the sun till it be dry, which will generally be in two days, in dry weather; and then it must be neatly bundled up.

After the rough preparer had got all the flax he had purchased dried, and laid up ready for the mill, he would have employment enough during the winter to prepare it, and dispose of it when ready; and as his attention through the whole year would be directed to one object, viz. to bring his flax to the best account, he would daily become more expert in every part of that line of business in which he was engaged, and the different processes which come under his province would be performed in a much more masterly manner than they can be at present. People, whose sole employment was the preparation of flax, would be provided with every thing necessary for that purpose. Their ingenuity would be set to work, to have every implement formed upon the best construction. They would provide themselves in pools, where there was plenty of soft pure water at command; and as they would have much occasion for these, they would be studious to keep them always in the best order. They would carefully watch the critical seasons of pulling the flax, and taking it out of the water. Every handful would be distinctly sorted, and put with others of the same quality; it would always be fully steeped without being rotted; it would be thoroughly dried and well preserved. And lastly, the work of the mill would be incomparably better executed by people working on materials of their own property, which they had been careful all along to put in the best possible order, than by a miller preparing for hire, various parcels, huddled around him from different quarters, and in different conditions. It will be difficult for any one who has not had opportunities to observe the loss and waste occasioned by errors in all the above articles, to form any judgment of the vast saving which would be made by a better arrangement.

It has been ascertained by frequent and accurate experiments, that the earth suffers very little diminution in proportion to the bulk of the plants which it produces, and consequently those plants must draw but a very inconsiderable part of their substance from that element. This is confirmed by the experience of the practical husbandman, who always finds such parts of his land as have produced a plentiful crop, in better order for the subsequent one, than those which have disappointed his expectations and yielded a poor one. Land is injured by being wrought into a tough paste, by wet labouring, by being continually ploughed and cropped without proper cleaning, till the roots and seeds of weeds get universal possession of it, and choke every thing which is sown upon it,—till the tenacity of the earth be destroyed by perpetual stirring, so that the tender roots of the plants cannot take sufficient hold to withstand the drought, and support the plant in a proper posture to receive the fostering influence of the atmosphere, or inhale the subterraneous perspirations which dispose the pores for the admission of those influences,—till the destructive vermin which hatch in the earth, and devour the roots of young plants, get full liberty to multiply and carry on their depredations,—and, finally, till the earth, when laid to rest for want of this tenacity, cannot retain the roots of that herbage which should form a close cover over its surface, in order to contain the internal heat, and defend it from the storms and rains which waste and wash away the soil. In Scotland, the harvest frequently is not greater in proportion to the greater extent of tillage. The returns from many fields, is sometimes not adequate to the seed and expense of labour bestowed on them. If land were never sown with grain, till it were in condition to produce a good crop, and laid always to rest, before it were disqualified to bear a close cover of grass, a greater quantity of corn would be produced upon less land, and at a less expense of culture, and, at the same time, more food for cattle. Upon the whole, if husbandmen were so easy in their circumstances, as to be able to follow a better course of agriculture, the land produce would be greater; and cultivating flax to supply the manufacture, as it would bring the money into the hands of our own husbandmen, which must now be sent abroad, would certainly have that effect.

NOTES REFERRED TO IN THE PRECEDING PAGES.

(1) The summers 1782 and 1784 were both very cold. In these years, a single stalk of corn required a pretty strong pull to break it; but in the present year (1785), the heat of which has been sometimes excessive, it is a common complaint among people employed in the harvest, that a handful has not strength sufficient to resist the pull necessary to bind the sheaf.

(2) Directed by a reference in the Letters on National Industry, I perused this Tract, in spring 1785, soon after I began to extend the present work.

(3) There are some other causes of failure, which are unnecessary to be mentioned here, but will be taken notice of as we proceed.

(4) What a blessing would it be to the people of the Highlands, whose wretchedness Mr. Knox represents in such strong colours, if the culture of flax and hemp were properly introduced among them? The valleys in that part of the kingdom, though unfit for corn, are remarkably well adapted to the production of these plants. The soil, enriched with the vegetative substance continually washed down from the mountains, is vigorous, and generally raises plants to a considerable height; there flax, nourished by the moist vapours and frequent showers, and defended from the scorching sun by the shade of the hills, would, for the most part, become a valuable crop. Hemp, which is much of the same nature, and requires a similar culture, would probably thrive equally well. The backwardness of the harvest would not be hurtful to these crops; they would come to maturity before the equinoctial rains came on. A shorter interval of fair weather would be sufficient to dry the steeped flax, when carefully turned out to the air, than what is requisite to prepare corn for the harvest-home. The numerous brooks and rills which flow from the mountains, would every where supply watering-places for steeping the crop, and drive mills for preparing it. The deep indented bays of the sea would furnish a great part of the country with the conveniency of water carriage for transporting the prepared materials coastways; and the same conveyance which carried away the flax and hemp, might bring corn for the use of the inhabitants. —The culture of flax and hemp would also be an excellent preparative for sowing artificial grasses for fodder to cattle; but it is not the best practice to sow grass-seeds with flax. When the grass grows vigorously the flax generally proves shorter, and the flaxen fibre is weakened towards the root of the stalk, by being smothered by the young grass.

(5) I do not mean to assert that repeated hoeings will entirely destroy all the kinds of those pernicious reptiles; some of them make their abode among the principal roots of plants, and remain fixed there, gnawing till they have destroyed the gourd which afforded them protection. There are many different tribes of this destructive class. The instructions for cultivating flax, formerly published under the authority of the Honourable Trustees, assert that one kind, there called the coup-worm, will not injure flax. What particular insect this may be, I know not. I am certain that one of the most common and most destructive kinds, that which afterwards becomes the gad-fly, and is equally mischievous in the air as it had been before in the earth, devours flax indiscriminately with other plants. It would be unprofitable to search the systems of nomenclators, to give the names and transmutations there assigned to them. It is sufficient to observe, that the most, if not all of them, are caterpillars or insects in a middle state, between embryo and perfection; it is therefore plain, that repeatedly stirring the ground must crush many of them, expose them to injuries, and put them into situations less favourable for their advancement, and so diminish their numbers.

(6) The French people brought over here, a number of years ago, to instruct the Scotch in raising flax, insisted much on the land being as rich as possible, and especially on giving fresh dung for the flax-crop immediately before sowing. There is reason to suspect that they were either ignorant or wished to mislead; for it is impossible that very rich land, heaving, at the same time, with the fermentation of putrid substances, can produce any plant with a firm stalk, covered with a thick tough rind. This I am positive is the case in Scotland at least; for I have always found, by experience, that flax, raised in such a manner, is neither productive nor of a fine quality.

(7) I apprehend I have made some mistake in this experiment; for when I sow flax at the rate of seven or eight pecks per acre, the seed seems to fall much thicker than five grains in the inch; but when I have reckoned the stalks on a square foot, I have never found more than five perfect stalks to the inch, and seldom so many.

(8) The whole of the flax alluded to was 26 threave and 6 sheaves; of this, 13 threaves and 3 sheaves were rough cleaned with hand instruments, and finished by the mill, which produced 122 lib. avoirdupois of scutched flax: the rest was neatly bundled up in threaves, and the three odd sheaves in a little bundle by themselves. Two threaves of this were hand-scutched in winter, and produced, as above, 19¼ lib. But the cleaning in this manner proved so laborious and expensive, that I stopped, and sent the remaining 11 threaves to the mill; the produce from which was 102 pounds. In the meantime the circumstance of the odd sheaves was quite forgot, and never more recollected till the year following, when they were found by chance in the place where they had been laid. The three sheaves ought to have produced 1 pound 12 hundred parts, which, with 102 and 19.25, makes 122.37. I have been more particular in narrating this experiment, as it turned out contrary to the prejudices I had adopted in common with others.

(9) A mistaken notion prevails that flax is the finer for being pulled green. The French instructors, mentioned in a former note, are said to have taught the same doctrine; in fact, however, it is very erroneous; it is not reasonable to suppose that flax will be fine in the flower, and coarse when it comes to seed: in this country, flax pulled before it comes to perfection, is always of little value. And since the above was written, I had an opportunity of conversing with a gentleman, a native of the Cambresis, who has been concerned in the cambric manufacture, and is well acquainted with all the processes upon flax, who says the case is the same in the Netherlands, and that their rule for pulling flax in that country, is the same with that given in the text.

(10) I suspect, however, as the American seed is small, this may be accounted for by over thick sowing.

(11) In the year 1782, when the crop was so much injured by the harvest frost, that there was great fear of want of seed for the ensuing spring, I made many little experiments on oats which had suffered from the chilling damp, to see if any of it might be trusted for the spring sowing. I found that more of these injured seeds, than I could have expected, put forth roots; but the roots were few and weak, compared with those of well preserved grain, and they were many days later in springing; the roots also were fewer and weaker, in proportion to the degree of injury which the seed seemed to have suffered; and some of them which put forth two or three small roots, rotted away, without producing a blade at the other end. I left some of this damaged corn to grow up in summer, in a soft well prepared soil. The blades were weak and slender; but every plant seemed to make efforts to put forth new roots near the surface. A few which succeeded, became large luxuriant stalks, and the rest fell down and withered, before they were eight or nine inches high.

(12) The whole field was the exact eighth part of a Scotch acre. There were 412 sheaves or beets, as they are called, pulled from it. Every 40 beets of the best, produced 22 pounds of scutched flax; so that if it had all been equally productive, there would have been 226½ pounds on the field, or a little more than 113 stones on an acre.

(13) As the softest water, that is, the water freest of all fossil admixture, is fittest for steeping flax, rivers and streams which have a long course fully exposed to the sun, generally possessing that quality in an eminent degree, are, excepting for the danger of floods, very fit for the purpose. For the benefit of manufacture, the law prohibiting the steeping of flax in rivers, ought to be repealed, as an invidious restraint upon useful industry. It is very doubtful if this practice be so fatal to fish as has been pretended. When flax lies at rest in the water, little fishes are seen sporting around it in safety. Indeed, when water is polluted by rinsing flax in it, such fishes as are overtaken in the impure stream, before it is cleared by running, are stupified, but on coming into fresh water recover, and, it is probable, none are killed but such as are found in small streams wholly impregnated with the mephitic matter which steeped flax emits. But whatever be the case, the preservation of a few fishes, for the amusement of the idle, ought not to come in competition with the general industry of the country.

ON THE

PREPARATION OF FLAX FOR SPINNING.

Flax, pulling of.—When the crop grows so short and branchy, as to appear more valuable for seed than flax, it ought not to be pulled before it be thoroughly ripe; but if it grows long and not branchy, the seed should be disregarded, and all the attention given to the flax. In the last case it ought to be pulled after the bloom has fallen, when the stalk begins to turn yellow, and before the leaves fall, and the bolls turn hard and sharp-pointed. When the stalk is small, and carries few bolls, the flax is fine: but the stalk of coarse flax is gross, rank, branchy, and carries many bolls. When the flax has fallen, and lies, such as lies ought to be immediately pulled, whether it has grown enough or not, as otherwise it will rot altogether. When parts of the same field grow unequally, so that some parts are ready for pulling before other parts; only what is ready should be pulled, and the rest should be suffered to stand till ready. The flax-raiser ought to be at pains to pull, and keep by itself, each different kind of lint which he finds in his field; what is both long and fine, by itself; what is both long and coarse, by itself; what is both short and fine, by itself; what is both short and coarse, by itself; and in like manner every other kind by itself that is of the same size and quality. If the different kinds be not thus kept separate, the flax must be much damaged in the watering and the other succeeding operations. What is commonly called *under growth* may be neglected as useless. Few persons that have seen pulled flax, are ignorant of the method of laying it in handfuls across each other; which gives the flax sufficient air, and keeps the handfuls separate and ready for the rippler.

Flax, rippling of.—After pulling, if the flax is to be regarded more than the seed, it should lie some hours upon the ground to dry a little, and so gain some firmness, to prevent the skin or harle, which is the flax, from rubbing off in the rippling; an operation which ought by no means to be neglected, as the bolls, if put into the water along with the flax, breed vermin there, and otherwise spoil the water. The bolls also prove very inconvenient in the grassing and breaking. In Lincolnshire and Ireland, they think that rippling hurts the flax; and, therefore, in place of rippling, they strike the bolls against a stone. The handfuls for rippling should not be great, as that endangers the lint in the rippling-comb. After rippling, the flax-raiser will perceive, that he is able to assort each size and quality of the flax by itself more exactly than he could before.

Flax, stacking of.—If the flax be more valuable than the seed, it ought by no means to be stacked up during winter; for its own natural juice assists it greatly in the watering; whereas, if kept long unwatered, it loses that juice, and the harle adheres so much to the boon, that it requires longer time to water, and even the quality of the flax becomes thereby harsher and coarser. Besides, the flax stacked up over year, is in great danger from vermin and other accidents; the water in spring is not so soft and warm as in harvest; and near a year is thereby lost of the use of the lint; but if the flax be so short and branchy as to appear most valuable for seed, it ought, after pulling, to be stooked and dried upon the field, as is done with corn; then stacked up for winter, rippled in spring; and after sheeling, the seed should be well cleaned from all bad seeds, &c.

Flax, watering and grassing of.—A running stream wastes the lint, makes it white, and frequently carries it away. Lochs, by the great quantity and motion of the water, also waste and whiten the flax, though not so much as running streams. Both rivers and lochs water the flax quicker than canals. But all flax ought to be watered in canals, which should be digged in clay ground if possible, as that soil retains the water best; but if a firm retentive soil cannot be got, the bottom or sides of the canal, or both the bottom and sides, may be lined with clay; or instead of lining the sides with clay, which might fall down, a ditch may be dug without the canal, and filled with clay, which will prevent both extraneous water from entering, and the water within from running off. A canal of forty feet long, six broad, and four deep, will generally water the growth of an acre of flax. It ought to be filled with fresh soft water from a river or brook, if possible, two or three weeks before the flax is put in, and exposed all that time to the heat of the sun. The greater way the river or brook has run, the softer, and therefore the better, will the water be. Springs, or short runs from hills, are too cold, unless the water is allowed to stand long in the canal. Water from coal or iron is very bad for flax. A little of the powder of galls thrown into a glass of water, will immediately discover if it comes from minerals of that kind, by turning it into a dark colour, more or less tinged in proportion to the quantity of vitriol it contains. The canal ought not to be under shade; which, besides keeping the sun from softening the water, might make part of the canal cooler than other parts, and so water the flax unequally. The flax-raiser will observe, when the water is brought to a proper heat, that small plants will be rising quickly in it, numbers of small insects and reptiles will be generating there, and bubbles of air rising on the surface. If no such signs appear, the water must not be warm enough, or is otherwise unfit for flax. Moss holes, when neither too deep nor too shallow, frequently answer well for watering flax, when the water is proper, as before described. The proper season for watering flax is from the end of July to the end of August. The advantage of watering flax as soon as possible after pulling, has been already mentioned. The flax being sorted after rippling, as before mentioned, should next be put in beets, never larger than a man can grasp with both his hands, and tied very slack with a band of a few stalks. Dried rushes answer exceedingly well for binding flax, as they do not rot in the water, and may be dried, and kept for use again. The beets should be put into the canals slope-ways, or half standing upon end, the root end uppermost. Upon the crop ends, when uppermost, there frequently breeds a deal of vermin, destructive of the flax, which is effectually prevented by putting the crop end downmost. The whole flax in the canal ought to be carefully covered from the sun with divots; the grassy side of which should be next the flax, to keep it clean. If it is not thus covered, the sun will discolour the flax, though quite covered with water. If the divots are not weighty enough to keep the flax entirely under water, a few stones may be laid above them. But the flax should not be pressed to the bottom. When the flax is sufficiently watered, it feels soft to the gripe, and the *harle* parts easily with the *boon* or *show*, which last is then become brittle, and looks whitish. When these signs are found, the flax should be taken out of the water, beet after beet; each gently rinsed in the water, to cleanse it of the nastiness which has gathered about it in the canal; and as the lint is then very tender, and the beet slackly tied, it must be carefully and gently handled. Great care ought to be taken that no part be overdone; and as the coarsest waters soonest, if different kinds be mixed together, a part will be rotted, when the rest is not sufficiently watered. When lint taken out of the canal is not found sufficiently watered, it may be laid in a heap for twelve, eighteen, or twenty-four hours, which will have an effect like more watering; but this operation is nice, and may prove dangerous in unskilful hands. After the flax is taken out of the canal, fresh lint should not be put a second time into it, until the former water be run off, and the canal cleaned, and supplied with fresh water. Short heath is the best field for grassing flax; as, when wet, it fastens to the heath, and is thereby prevented from being blown away by the wind. The heath also keeps it a little above the earth, and so exposes it the more equally to the weather. When such heath is not to be got, links or clean old lea ground is the next best. Long grass grounds should be avoided, as the grass growing through the lint frequently spots, tenders, or rots it; and grounds exposed to violent winds should also be avoided. The flax, when taken out of the water, must be spread very thin upon the ground; and being then very tender, it must be gently handled. The thinner it is spread the better, as it is then the more equally exposed to the weather. But it ought never to be spread during a heavy shower, as that would wash and waste the harle too much, which is then excessively tender, but soon after becomes firm enough to bear the rains, which, with the open air and sunshine, cleans, softens, and purifies the harle to the degree wanted, and makes it blister from the boon. In short, after the flax has got a little firmness by being a few hours spread in dry weather, the more rain and sunshine it gets the better. If there be little danger of high winds carrying off the flax, it will be much the better of being turned about once a-week. If it is not to be turned, it ought to be very thin spread. The spreading of flax and hemp requires a deal of ground, and enriches it greatly. The skilful flax-raiser spreads his first row of flax at the end of the field opposite to the point from whence the most violent wind commonly comes, placing the root ends foremost; he makes the root ends of every other row over-lap the crop ends of the former row three or four inches, and binds down the last row with a rope; by which means the wind does not easily get below the lint to blow it away; and as the crop ends are seldom so fully watered as the root ends, the aforesaid over-lapping has an effect like giving the crop ends more watering. Experience only can fully teach a person the signs of flax being sufficiently grassed; then it is of a clearer colour than formerly; the harle is blistered up, and easily parts with the boon, which is then become very brittle. The whole should be sufficiently grassed before any of it is lifted; for if a part be lifted sooner than the rest, that which remains is in great danger from the winds. A dry day ought to be chosen for taking up the flax; and if there is no appearance of high wind, it should be loosed from the heath or grass, and left loose for some hours, to make it thoroughly dry. As a great quantity of flax can scarcely be all equally watered and grassed, and as the different qualities will best appear at lifting the flax off the grass; therefore at that time each different kind should be gathered together, and kept by itself; that is, all of the same colour, length, and quality. The smaller the beets lint is made up in, the better for drying, and the more convenient for stacking, housing, &c. and in making up these beets, as in every other operation upon flax, it is of great consequence that the lint be laid together as it grew, the root ends together, and the crop ends together.

Flax-dressing.—For many ages it was the practice to separate the boon or core from the flax, which is the bark of the plant, by the following simple *hand methods*. First, for breaking the boon, the stalks in small parcels were beat with a mallet; or, more dexterously, the *break* was used thus: The flax being held in the left hand across the three *under teeth*, or *swords* of the break, the *upper teeth* were with the right hand quickly and often forced down upon the flax, which was artfully shifted and turned with the left hand. Next, for clearing the flax of the broken boon, the workman with his left hand held the flax over the *stock*, while with his right hand he struck or threshed the flax with the *scutcher*. These methods of breaking and scutching the flax being slow and very laborious, a *water-mill* was invented in Scotland about fifty years ago; which, with some late improvements, makes great dispatch, and in skilful and careful hands gives satisfaction. It has been generally constructed to break the boon by three dented rollers, placed one above the other. The middle one, being forced quickly round, takes the other two along with it; and one end of the handfuls of the flax being by the workmen directed in between the upper and middle rollers, the flax is immediately drawn in by the rollers; a curved plate of tin behind the rollers directs the flax to return again between the middle and undermost rollers;—and thus the operation is repeated until the boon be sufficiently broke. Great weights of timber or stone at the end of levers, press the upper and under rollers towards the middle one. The scutching is next carried on by the mill, in the following manner:—Four arms, something like the hand-scutchers, project from a perpendicular axle; a box around the axle incloses these projecting scutchers; and this box is divided among the workmen, each having sufficient room to stand and handle his flax, which, through slits in the upper part and sides of the box, they hold in to the stroke of the scutchers; which moving round horizontally, strike the flax across or at right angles, and so thresh out or clear it of the boon. The breaking of the flax by *rollers* is scarcely subject to any objection, but that it is dangerous to workmen not sufficiently on their guard, who sometimes allow the rollers to take hold of their fingers, and thereby their whole arm is instantly drawn in: thus many have lost their arms. To avoid this danger, a break, upon the principle of the hand break, has been lately adapted to water machinery, and used in place of rollers. The horizontal stroke of the scutchers was long thought too severe, and wasteful of the flax; but very careful experiments have discovered that the waste complained of must be charged to the unskilfulness or negligence of the workmen, as in good hands the mill carries away nothing but what, if not scutched off, must be taken off in the heckling with more loss both of time and flax. But to obviate this objection of the violence of the *horizontal scutchers*, an imitation of hand scutching has lately been applied to water. The scutchers then project from an horizontal axle, and move like the arms of a check reel, striking the flax neither across nor perpendicularly down, but sloping in upon the parcel exactly as the flax is struck by the hand-scutcher. This sloping stroke is got by raising the scutching-stock some inches higher than the centre of the axle; and by raising or lowering the stock, over which the flax is held, or screwing it nearer to or farther from the scutchers, the workman can temper or humour the stroke almost as he pleases. A lint-mill, with horizontal scutchers upon a perpendicular axle, requires a house of two stories, the rollers or break being placed in the ground story, and the scutchers in the loft above; but a mill with vertical scutchers on an horizontal axle, requires but one ground story for all the machinery. Another method of breaking and scutching flax, more expeditious than the old hand methods, and more gentle than water-mills, has also been lately invented in Scotland. It is much like the break and scutcher, giving the sloping stroke last described, moving by the foot. The treddle is remarkably long, and the scutchers are fixed upon the rim of a fly-wheel. The foot-break is also assisted in its motion by a fly. These foot machines are very useful where there are no water-mills, but they are far inferior to the mills in point of expedition. The next operation that flax undergoes is heckling. The *heckle* is firmly fixed to a bench before the workman, who strikes the flax upon the teeth of the heckle, and draws it through the teeth. To persons unacquainted with that kind of work, this may seem a very simple operation; but, in fact, it requires as much practice to acquire the slight of heckling well, and without wasting the flax, as any other operation in the whole manufacture of linen. They use coarser and wider teethed heckles, or finer, according to the quality of the flax; generally putting the flax through two heckles, a coarser one first, and next a fine one.

ON THE CULTURE OF FLAX.

BY ROBERT SOMERVILLE, Esq.

Flax and hemp are articles so essentially necessary to the British Kingdom, that it is matter of astonishment the culture of them should be so much neglected, and the management even of the small quantity that is cultivated so very defective. The liberality of Government has for many years held forth great encouragement for promoting the growth and manufacture of these necessary articles, by expending large sums in bounties; notwithstanding which, the object so much desired has by no means been obtained to the extent that could be wished, the cultivation being still extremely limited, and the management in every stage, both of the culture and manufacturing into flax, very defective. This is the more to be regretted, as there can be little doubt that immense quantities might be raised in Britain with little labour, and that too upon soils where hardly anything else will grow; and every part of the management, from the time of sowing, till it is manufactured into flax, very easily taught to the country people.

The accomplishment of an object so truly desirable, would be attended with the most salutary effects, by affording employment for an increased population, and materially lessening our dependence upon other nations.

The purpose of the following pages is, first, to give a general sketch of the present mode of cultivating and managing flax, then to enter into the detail of the principal operations, point out what appears defective in each, and offer some hints for improvement.

No regular system is at present pursued by those who cultivate flax, and very little attention is paid, either to the nature of the soil upon which it is sown, or the preparation of that soil. Except in a few instances, it is cultivated upon a very contracted scale, seldom more than an acre or two being in the possession of one person, and, in many cases, it does not exceed half or a quarter of an acre, as may be seen by looking over the premiums awarded by the Honourable Board of Trustees.

There are instances, however, of farmers who have attempted it upon a larger scale, and have sown forty or fifty acres in one season; but these last are few in number, and even of them there are some who have lost by the undertaking. In the present state of Britain, with regard to provisions and population, the question is of high importance, whether a part of the arable lands, which are now acknowledged to be barely sufficient for producing a due proportion of grain, and other necessaries of life, can with safety be withdrawn from that purpose, and employed in any other way.

Humanity, as well as sound policy, forbids the attempt; the effect certainly would be that of enhancing the price of provisions, a calamity which has already been but too severely felt.

This consideration, though it may deter proprietors and farmers from using their good arable lands in that way, does not preclude the idea of raising flax to a great extent; at present, there are immense tracts, under the denomination of moors, mosses, swamps, waters, &c., upon which flax and hemp may not only be successfully raised, with little labour, and at small expense, but the tillage and other operations given for the flax crops, will greatly facilitate their improvement, and put them in a proper train for the culture of grain, &c.

It is well known to those who have had much experience in the raising of flax and hemp, that very large crops of both may be obtained from lands of the above description, not only with safety, but with advantage to the soil. Property of this sort is allowed to remain in a state of nature; in some cases, from an idea that it is not worth improving, and in others, on account of the great labour and heavy expenses of purchasing lime and other manures, sufficient to render it fit for carrying grain.

Fortunately flax requires no such expensive preparation, tillage alone, and the cost of the seed, are all that are necessary; and the crop in general, when properly managed, will not only repay them, but afford a profit sufficient to enable the cultivator to purchase lime, or other manures, for his future crop. In that way, double benefit will result to the community; first, by keeping great sums of money in the country that are yearly sent abroad, and, at the same time, furnishing an abundant supply of an article that cannot be done without; and, secondly, by assisting and holding out an incentive for the cultivation of waste lands.

In a paper formerly presented to the Board of Agriculture, and which is now published in the Report of their Committee, on the subject of potatoes, notice is taken of the ease with which that valuable root may be cultivated on waste and unimproved soils, and the advantages that may arise from the practice pointed out. Perhaps the attainment of that important national object, the cultivation of waste lands, will be more promoted by the general introduction of flax or potatoes, as first crops, than by any other means. Neither of them require any expense, except seed and tillage. They increase the materials for several valuable manufactures, furnish a wholesome and nutritious article of food, afford a profitable return to the cultivator, and give employment to many hands.

To those who are judges of the real interests of their country, the importance of what is above-mentioned will be evident, even if the cultivation of flax were confined merely to supplying ourselves; but, perhaps the matter ought to be carried farther, and Britain might soon be able to rival Holland, &c., in supplying other nations. The soil of this country is at least equally fertile, and the climate as genial as that of Holland, or the provinces on the shores of the Baltic. Why, then, should the crops of flax raised here be more scanty, or the quality inferior, to what is produced in those parts? The only thing wanting, seems to be a knowledge of the method of managing the crop, in which the British, notwithstanding every attempt to the contrary, are still extremely defective.

Owing to its exhausting quality, the cultivation has been laid aside by opulent and extensive farmers, and is now principally in the hands of small tenants and cottagers, the latter of whom, especially in Scotland, have the privilege of sowing a small quantity upon the lands of their masters. In the improved counties, this privilege is fast wearing out, and the places where it principally prevails at present, are the north of Scotland, and the Islands, where the generality of farms is still small, and good husbandry is far from being so well understood as could be wished. From this view of the matter, it will appear that the quantity raised over the whole Island is small; and from the ignorance and want of capital in the persons who raise it, the management must, of course, be defective, and that a very great proportion of all that is used in Britain, must be imported either from Holland or the Baltic.

FLAX-SEED.—The quantity of flax raised in Britain is not only small, but the seed from which even that small quantity is raised is annually imported, either from Holland or the Baltic, from an absurd and erroneous opinion, that after seed has been once sown in this country, the produce is unfit for that purpose afterwards. How such an idea came to be entertained at first, it is difficult to imagine. Britain is well known to be famous for the growth of grain, and other vegetables; why, then, should it be incapable of producing flax, an article that arrives at great perfection in Holland and elsewhere, upon worse soils, and in much more inhospitable climates? Were it a matter on which any doubt could be entertained, the subject is sufficiently important to entitle it to a complete investigation. To those, however, who are acquainted with the soil and climate of Holland, and other parts from whence flax is imported into this country, and who are capable of making a just comparison between them and Great Britain, such an inquiry will appear superfluous, as the advantage is decidedly in favour of the latter.

The fact seems to be, that the Dutch, who have been long in possession of that trade, and who have, in consequence, arrived at a high degree of perfection in the management of flax, in all the different stages, both of its growth and manufacture, are enabled not only to raise and dress it much better than we are, but can bring it into the market at a cheaper rate, and as they have found it a most profitable article, they have industriously propagated an idea, which has been as readily believed in this country, that both the seed and flax raised in Great Britain are greatly inferior to what is produced in Holland.

It must be admitted that where the crop is cultivated for the sake of the flax only, it is generally separated from the ground at so early a period, that the seed has made very small progress in ripening, and of course would, upon trial, be found very unfit for the purpose of sowing next year. While this practice, for which no reason that is completely satisfactory has yet been assigned, continues, a new supply of seed will be annually required; but I shall endeavour to show, in a subsequent part of this paper, that, with proper management, and without any additional expense, it is possible to unite the advantages of well matured seed, and a valuable crop of flax. This is no visionary idea, as it is done in Holland and elsewhere every year, and the whitest, most durable and easiest bleached flax produced in those parts, is from crops where the seed has been completely ripened. It has been argued, and with some degree of plausibility, that where the seed is ripened, the quality of the flax is not only worse, but the soil is also much more exhausted than in cases where it is pulled green. At first view, this argument appears well founded; and, certainly, if flax were pulled while it is in flower, the exhaustion of the soil would be infinitely less than when the seed is allowed to ripen; but when it is considered that at the usual time of pulling, the seed is not only formed, but has made a very considerable progress, if a careful inquiry is made, it will be found that the crop has in that stage drawn as much oil, and other useful principles from the earth, as it possibly can do. For, though the seed of flax at that period contains less oil than it does when completely ripened, yet that portion which is deficient in the seed will be found to exist in the stalk, in the form of a mucilage, which the vessels of the plant, aided by the operation of light and heat, would soon have converted into oil also. If this reasoning is sustained (and some trials which I have made, go a great way to support it), the exhaustion of the soil must be the same in both cases; the only difference is, that by allowing the crop to remain in the ground, vegetation is continued till the plant is perfected, and a complete separation of its component parts takes place. By this separation the oil will be deposited in the seed, the aqueous juices will be dried and exhaled by the sun; the stalk and flax being deprived of these will assume a white appearance, and the gummy or mucilaginous juices being exhausted, little or no impediment will remain in the separation of the flax from the stalk; for, as I will afterwards show, one of the principal obstacles to the separation of the flax from the stalk, arises from the glutinous nature of the juices contained in green flax. With regard to the flax being of a coarser quality when the seed is allowed to ripen, than when it is pulled green, I have no hesitation in saying that this is an error; I will even go farther, and assert that the ripening of the seed may not only be attempted with perfect safety, but that the flax will be whiter, and every operation it has to go through, facilitated thereby. But this will be illustrated more at large in a different part of this memoir: the only thing intended to be inculcated in this place, is, that flax-seed of the best quality may be raised in Britain, without injuring the flax or exhausting the soil, more than is commonly done for crops where the flax is pulled green.

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Mr. Somerville having stated at great length, and very satisfactorily, a variety of important facts respecting the culture and preparation of flax (a subject at all times of much importance to this country, but more especially at present, when both the Baltic and shores of America are shut up from us), towards the conclusion says, such are the ideas that have occurred to me in considering this very important branch of the rural economy of Great Britain, and which I now submit, with all possible deference, to the Honourable Board of Agriculture. A part of the proposed improvements is founded upon experiments; the remainder, is the result of observations made at different times. I have it to regret, however, that as neither the observations nor experiments were made with a view to publication, and as I was generally much occupied by other avocations at the time, they are far from being so perfect as I could have wished. I trust, however, that the hints thrown out, however defective, will ultimately lead to a complete and scientific examination of the subject, and that a system of management will soon be established upon solid and durable principles.

The points seemingly most worthy of minute investigation are the following:—

1. The chances of raising hemp successfully upon swampy and marshy grounds, by cutting open drains between the ridges.

2. The practicability of raising flax upon mosses, moors, and waste lands, with a profit to the cultivator, and as a step to their future improvement.

3. To ascertain what benefit would arise from sowing flax at an earlier period of the season than is done at present.

4. To ascertain whether the mode of pulling flax above pointed out, is better calculated to separate the long from the short flax, and the fine from the coarse, than the method at present in use.

5. To ascertain whether the seed can be ripened without detriment to the flax; and if the quality is coarse when the seed is ripened, to determine how far it is inferior to what is pulled green; and whether the value of the seed will not be more than an equivalent for the difference of the quality.

6. To determine whether the flax that has ripened the seed, contains less mucilage and colouring matter than that which is pulled green; and which of the two requires the greatest labour in the manufacturing.

7. To ascertain, by careful experiments, the best and most speedy means of watering flax, so as to produce an easy separation between it and the husk or stalk, and, at the same time, purge it of the mucilage, colouring matter, &c., contained in it.

8. To make comparative trials between parcels of the same flax that has been steeped an unequal length of time, from two to eight weeks, with a view to regulate the duration of the steep.

9. To make comparative trials between parcels of flax that has had only a simple steeping, and other parcels of the same flax that has been dipped in boiling water before and after the steeping.

10. To ascertain whether the addition of potash or lime water, or a mixture of both, to the boiling water in which the flax is dipped, will facilitate the subsequent operations, without injuring the flax, and in what degree.

11. To ascertain whether flax created in the manner mentioned in the last two articles, is whiter, finer, or more easily bleached.

12. To ascertain whether the mode recommended of boiling, &c., is calculated to increase or diminish the strength and durability of the flax.

13. To determine experimentally whether flax that is sown thin, and grows tall and strong in the stalk, is inferior to that which is thicker sown, and smaller in the stem.

14. To try whether any improvement can be made upon the rollers of the flax-mills, so as to break the husk as much as possible, and by that means render the separation between it and the flax more easy.

15. To try whether any improvement can be made in the mode of scutching,

so as to prevent the flax from being wasted and broken in the operation. N.B. I am of opinion, improved rollers at the flax-mills, with very small deep fluting, would render the scutching less severe.

16. To determine comparatively, whether long or short heckles make least refuse in dressing the flax. I think short heckles would dress it equally well, and waste less of it.

17. To determine, by fair trials, whether the use of a great number of heckles is more profitable than putting the flax through only two, three, &c., beginning with very coarse ones, and ending with the finest.

Such are the points respecting flax management that seem to me most deserving of experimental inquiry, and the thorough investigation of which promises to afford sufficient data for laying the foundation of a more perfect system than the present.

ON THE CULTURE AND TREATMENT OF FLAX.

BY AN AGRICULTURIST OF FIFESHIRE.

The flax-seed is generally sown the last of March, or two first weeks in April. It is usually sown as a second crop, from clover-seed; but can be put with equal propriety, after clover or any green crop. In this case it requires little hand weeding. If sown after a white crop, the shellis and other weeds must be taken out amongst it. Lands that have been long in pasture, or new soils, are most suitable for flax; it blooms twice: the kout which contains the seed forms on the top of the stalk (as large as a garden pea) with a prickly point; becomes hard before being ripe, and the stalk assumes a yellow colour before you pull. It must be pulled with the hand, tied up in sheaves of fifteen inches girth, and carried away for steeping, as by standing for days in the sun, it loses that soft texture so desirable to be preserved. The length of time required for steeping varies according to the heat of the weather, and kind of water you have: running streams, mineral, and even spring water ought not to be used; dig holes in the land, where you can send soft water into them. Provided it does not arise from digging the pit, stony, or other heavy material, must be laid on to keep from floating, and no portion allowed to remain above the water. The most difficult of all, is the steeping process, and great attention is required. If taken from the water too soon, the flax will not separate from the stalk; if a day or two too long, it rots, and gets useless. You must try now and then if the stalk snaps easily, and separates from the flax: in this climate, it generally takes from two to three weeks. Carry away, and spread upon the ground very thin; it must be carefully kept even, and not twine (some handfuls one way and some another). To avoid this, the person spreading keeps always the root end next himself while spreading in rows, the form that hay is left by the scythe in cutting; and when you lift from the ground, the reaping-hook is used in lifting, beginning always at the end of the row you stop at when spreading. After being quite dry, should you not think it properly steeped, it can remain upon the ground without risk, till sufficiently so. It must be securely stacked, as, unless kept dry, will not dress well at the mill.